

PROJECT FACT SHEET

CONTRACT TITLE: Advanced Geostatistical Reservoir Characterization (HBCU)

ID NUMBER: DE-FG22-95MT95015

B & R CODE: AA1525150

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PROJECT SITE

CITY: Fort Valley

STATE: GA

CITY: Albuquerque

STATE: NM

CITY:

STATE:

CONTRACT PERFORMANCE PERIOD:

10/01/1995 to 09/30/1997

PROGRAM: HBCU

RESEARCH AREA: HBCU

FUNDING (\$1000'S)	DOE	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	140	0	140
FISCAL YR 1997	0	0	0
FUTURE FUNDS	0	0	0
TOTAL EST'D FUNDS	140	0	140

OBJECTIVE: To apply new geostatistical interpolation and stochastic simulation techniques using the existing data of an already well characterized reservoir to produce new interpretations of hydrostratigraphic facies units without regard to the previous interpretations and then compare the results of the geostatistical estimates and interpolation to their conventionally derived analogs.

METRICS/PERFORMANCE:

Products developed:

PROJECT DESCRIPTION:

Background: The DOE seeks innovative methods and concepts that will contribute to more efficient, effective, and economical techniques for the recovery of domestic oil in declining fields. Geologic reservoir heterogeneities and the natural flow and transport processes that they control are known to be responsible for the entrapment of mobile oil in bypassed pockets. The DOE estimates this domestic resource at as much as 100 billion barrels of bypassed mobile oil. Much of this remaining oil could be produced by conventional method if its location and the cause of its non-recovery can be determined. This project involves an innovative research effort for investigating the application of advanced geostatistical techniques for computer modeling of reservoir/fluid interactions. New geostatistical methods are proposed for the current research that could provide better capabilities for defining petroleum reservoir anatomy and allow better predictions and/or simulations of reservoir fluid flow and petroleum migration. These advanced geostatistical analysis techniques coupled with expert geologic interpretation will provide as a means of developing better and more complete understanding of the internal hydrofacies architecture of reservoirs, emphasizing the location and prediction of pore scale to inter-well heterogeneities. These techniques may also provide a new means for determining how reservoir anatomy governs reservoir fluid movement.

Current project is a joint venture between Fort Valley State College (FVSC), an institution of higher learning and Applied Research Associates (ARA), Inc., a research and development engineering firm.

Work to be performed: 1) Apply the new geostatistical interpolation and stochastic simulation techniques using the existing data set of the King field (an oil field in Illinois), to produce new interpretations of hydrostratigraphic facies units without reading to the previous conventional geologic interpretation. 2) Calculate variograms of lithology, porosity, and SP of King field data set. 3) Calculate a kriged grid based on variographic results. 4) Compare the results of the geostatistical estimates and interpretations to their conventional geologically derived analogs. 5) Interpretation of results and documentation of final report.

PROJECT STATUS:

Current Work: 1) Variographic analysis is being performed to get an understanding of any correlation and trends present in the data. 2) Kriging calculations are being performed to minimize the variance of the estimation errors associated with the variographic analysis. 3) Documentation of the project design and interpretation of present results are in progress. 4) ARA is providing advice and technical assistance to the students and faculty of FVSC for the project.

Scheduled Milestones:

Conduct additional runs on variographic analysis & kriging at ARA & FVSC	10/96
Perform post processing of data and final reporting and documentation at FVSC	11/96

Accomplishments: I. Work at Fort Valley State College: 1) Bibliography was prepared from an extensive literature search using the internet and source documents already provided by ARA investigators. This result will serve as an appendix to the final report. 2) Weekly seminars were held to familiarize the students and faculty members of FVSC with fundamentals of geostatistics. 3) Internet connection between FVSC and ARA was successfully established. 4) ARA/FVSC has already identified the oil field data set (King Field data of the Illinois State Geologic Survey). The data set has already been transferred by ftp to FVSC and ARA computer site. On initial review the data looked suitable for the current project purposes. 5) Geostatistical software (ISATIS) was selected to conduct geostatistical analysis. GEOMATH, the distributor of ISATIS was contacted and it was decided to lease this software at a rate of \$2500/year (plus an installation fee of \$550) for one year. 6) To run the geostatistical software, gcc (c compiler needed for compilation of source codes) and bash (a shell program to enable history editing and navigation) have been installed on FVSC's UltraSparc Workstation. 7) The FVSC undergraduate students involved with the project, presented a poster session at the Fourth Annual Historically Black Colleges and Universities/Private Sector Energy Research and Development Technology Transfer Symposium held in Greensboro, NC on April 3, 1996.

II Summer work at Applied Research Associates, Inc.: 1) A Sun Workstation with monitor was rented at a total cost of \$1755 for 75 days and installed ISATIS software for geostatistical analysis. 2) The software license was changed from FVSC to ARA at a cost of \$100. 3) King field data was reviewed using a geological software, Stratamodel and domains for geostatistical analysis were selected. 4) A Quality Analysis/Quality Control was performed on the King field data using Excel. 5) Preprocessing and scoping runs have been conducted on the acquired data. 6) The data was loaded on ISATIS for geostatistical analysis.